

## THE FISHES OF MOHAVE RIVER, CALIFORNIA.

By JOHN OTTERBEIN SNYDER,  
*Of Stanford University, California.*

The Mohave River has its origin in the San Bernardino Mountains of southern California. Its tributaries drain a relatively small area of the northern slopes of the ranges which separate its basin from that of the Santa Ana River. It flows down the mountains and almost directly across the Mohave desert, where its dwindling current is at length consumed by evaporation or absorbed by the dry earth. Throughout the greater part of its course it receives no addition to its volume except the water of an occasional spring.

Relief maps do not seem to indicate that the river ever had an outlet in the direction of its course, the sink where it disappears lying in a depression which is mostly surrounded by low mountains except where the river enters. From the San Joaquin basin the Mohave is separated by the high mountains which connect the southern Sierras with the Coast Ranges; besides, a wide expanse of desert intervenes between these mountains and the river channel. The flow of the Mohave is rather fluctuating and uncertain, sudden desert storms and long dry periods contributing in turn to an inconstant river volume.

The fishes of the Mohave River belong to a single species,<sup>1</sup> a member of the genus *Siphateles*,<sup>2</sup> a channel and lake minnow which occurs in the Sacramento-San Joaquin, Klamath, Oregon Lake, Columbia, and Lahontan systems, and Owens River. The species of this group are very closely related, intergradation of distinctive characters being not unusual. In a measure they resemble geographic races or subspecies of birds and mammals as usually defined, except that being fluvial and lacustrine forms, the range of each is definitely circumscribed, and no intermingling or interbreeding of individuals of different forms is possible. Species of *Siphateles* are not known from Santa Ana or Colorado rivers.

The Mohave species was recorded by Girard in 1856 as *Algansea formosa*.<sup>3</sup> It was then identified with examples of the genus from Merced (Mercede) River, a tributary of the San Joaquin, and until recently the species was regarded as synonymous with *Hesperoleucus*

<sup>1</sup> The river has not been thoroughly searched for fishes. A collection made near Victor by Mr. Clarence H. Kennedy, and some specimens secured by Mr. Dane Coolidge at Barstow have served as a basis for these notes.

<sup>2</sup> Bull. Bureau Fish., vol. 35, 1915-16, p. 60.

<sup>3</sup> Proc. Acad. Sci. Phila., 1856, p. 183. Cotypes of *Algansea formosa* are in the U. S. National Museum, No. 196 from Merced River, and 197 from Mohave River. They are not well enough preserved for careful comparison, although they serve to show without doubt what species the author described. Merced River is the first locality mentioned, and therefore the name *formosa* may be retained for the Sacramento-San Joaquin form.

(*Rutilus*) *symmetricus*.<sup>1</sup> The large series of specimens from the Mohave reveals a considerable degree of differentiation when comparisons are made with specimens of *S. formosus* and *S. obesus*, the two species which are geographically nearest them. *S. obesus* is indigenous to the Lahontan system and Owens River. The immediate relationship of the Mohave form, which may be known as *Siphateles mohavensis*, can not be determined with certainty from an examination of the fishes, and unless the geology of the region points to some previous connection between the Mohave basin and the Sacramento-San Joaquin or the Lahontan systems, the question may remain only partly answered. There is reason to doubt the possibility that the species reached the Mohave through stream capture near the headwaters, as the species of *Siphateles* appear to be lacustrine and channel forms and are not known to migrate far up into the smaller tributaries. The occurrence of the genus in streams without deep, slough-like channels or direct connection with a lake is rare, and individuals are not at any time found at a distance from such places.

Tables intended to illustrate some of the more evident differences which separate *S. mohavensis*, *S. formosus*, and *S. obesus*, and a description of *S. mohavensis* follow.

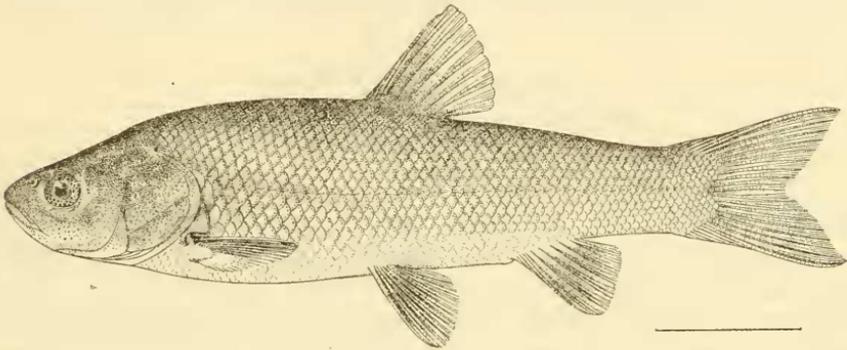
Scales lateral series.....	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
<i>S. mohavensis</i> .....			1	5	10	11	15	10	14	13	6	1					
<i>S. formosus</i> .....	2	6	12	18	13	17	19	16	9	4	2						
<i>S. obesus</i> .....							1	2	2	13	6	16	13	5	7	4	1
Scales before dorsal.....	22	23	24	25	26	27	28	29	30	31	32	33					
<i>S. mohavensis</i> .....		4	10	17	16	19	14	6	1								
<i>S. formosus</i> .....	1	8	10	16	13	9	2										
<i>S. obesus</i> .....						4	9	17	16	18	3	2					
Scales below lateral line.....			5	6	7	8											
<i>S. mohavensis</i> .....				27	25	2											
<i>S. formosus</i> .....			5	13	1												
<i>S. obesus</i> .....					43	22											
Height dorsal fin.....	.16	.17	.18	.19	.20	.21	.22	.23	.24	.25	.26						
<i>S. mohavensis</i> .....		3	12	4	12	2											
<i>S. formosus</i> .....			2	1	5	16	10	13	7	2	2						
<i>S. obesus</i> .....		.15	8	10	8	5											
Height anal fin.....	.12	.13	.14	.15	.16	.17	.18	.19	.20								
<i>S. mohavensis</i> .....		3	8	11	8	1	1										
<i>S. formosus</i> .....				1	15	6	18	12	4								
<i>S. obesus</i> .....		7	12	12	9	6											
Length caudal fin.....	.21	.22	.23	.24	.25	.26	.27	.28	.29	.30	.31	.32	.33	.34			
<i>S. mohavensis</i> .....			3	9	10	6	4										
<i>S. formosus</i> .....					1	1		7	9	12	1	8	11	6	4		
<i>S. obesus</i> .....	1	1		7	15	12	8	6	4								
Number of dorsal rays.....			8	9													
<i>S. mohavensis</i> .....			48	5													
<i>S. formosus</i> .....				59													
<i>S. obesus</i> .....			85	3													

Description of *Siphateles mohavensis*, type No. 76837, U.S.N.M., from the Mohave River near Victor, California, August 14, 1915. Clarence H. Kennedy, collector.

Total length, 149 mm.; length to base of caudal, 122; head, 3.5 in the length; depth, 3.5; depth caudal peduncle, 8; length snout, 3.6 n head; diameter eye, 5.2; with interorbital space, 2.9; scales n lateral series, 50; between occiput and dorsal fin, 26; above lateral line, 12; between lateral line and base of ventral, 7.

<sup>1</sup> Bull. U. S. Bureau Fisheries, vol. 27, 1907, p. 137.

The species has a large head, deep and heavy body, short and rounded fins. The snout is short, the maxillary oblique, the interorbital space broad and rather flat, the dorsal outline of the head slightly concave. The origin of the dorsal is immediately over that of the ventrals, halfway between the anterior border of the eye and end of last vertebra. The lateral line is complete. The gillrakers are short and pointed, flat, and triangular. They decrease in size gradually from the middle to the ends of the arch. They number



SIPHATELES MOHAVENSIS.

from 21 to 24, 6 or 7 on the short limb of the arch. Pharyngeals short and heavy, the teeth slightly hooked, with broad grinding surfaces. There are usually 4, sometimes 5, on the right side; 5 on the left (gillrakers and pharyngeals from paratypes). Upper surface of head and body dusky, the fins all dark. Each scale with a definite dark border and a lighter center.

The following measurements are expressed in hundredths of the length:

Length of body.....mm..	122	115	107	113	105	99	107	95	95	102
Length head.....	.29	.29	.275	.28	.28	.29	.28	.285	.29	.29
Depth body.....	.29	.29	.28	.275	.265	.27	.28	.29	.31	.29
Depth caudal peduncle.....	.125	.12	.12	.125	.12	.12	.125	.12	.12	.12
Length caudal peduncle.....	.20	.19	.195	.18	.20	.20	.21	.18	.21	.195
Length snout.....	.085	.08	.08	.09	.08	.08	.08	.08	.08	.09
Diameter eye.....	.056	.058	.053	.055	.055	.06	.055	.06	.06	.06
Interorbital width.....	.10	.10	.093	.10	.09	.095	.095	.095	.09	.10
Depth head.....	.21	.20	.20	.20	.195	.20	.19	.20	.20	.20
Snout to occiput.....	.21	.22	.205	.21	.22	.22	.21	.22	.20	.21
Snout to dorsal.....	.55	.565	.535	.55	.57	.56	.56	.56	.55	.57
Snout to ventral.....	.55	.56	.57	.56	.56	.54	.54	.58	.55	.565
Length base of dorsal.....	.125	.125	.12	.13	.105	.12	.12	.105	.125	.105
Length base of anal.....	.09	.095	.08	.09	.085	.095	.08	.09	.09	.08
Height dorsal.....	.175	.195	.18	.175	.17	.18	.175	.18	.19	.17
Height anal.....	.135	.15	.14	.145	.13	.14	.13	.15	.16	.13
Length pectoral.....	.18	.19	.175	.175	.17	.18	.18	.18	.21	.19
Length ventral.....	.15	.17	.16	.155	.15	.16	.16	.155	.18	.16
Length caudal.....	.25	.24	.23	.24	.24	.23	.235	.25	.24	.24
Dorsal rays.....	9	8	9	8	8	8	9	9	8	8
Anal rays.....	8	8	8	8	8	8	8	8	8	8
Scales lateral line.....	50	49	53	49	53	53	52	48	54	54
Scales above lateral line...	12	13	12	11	11	12	12	11	11	12
Scales below lateral line...	7	7	8	7	7	7	7	7	7	7
Scales before dorsal.....	26	25	28	26	24	25	27	23	26	27